Upsilon R_{AA} in sPHENIX proposal vs. current result
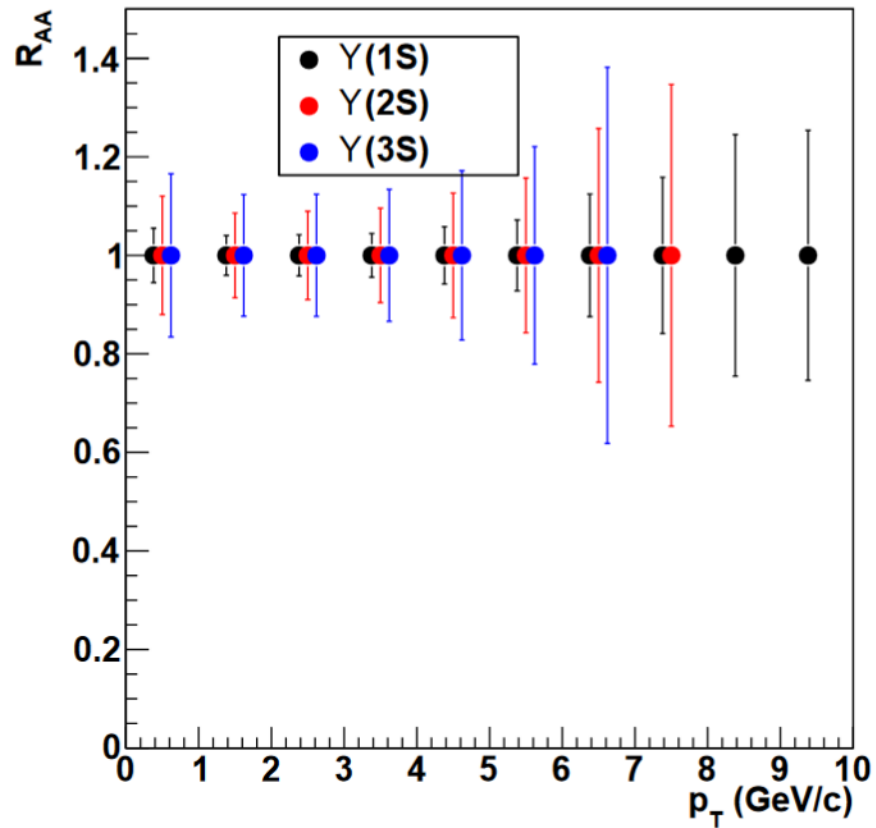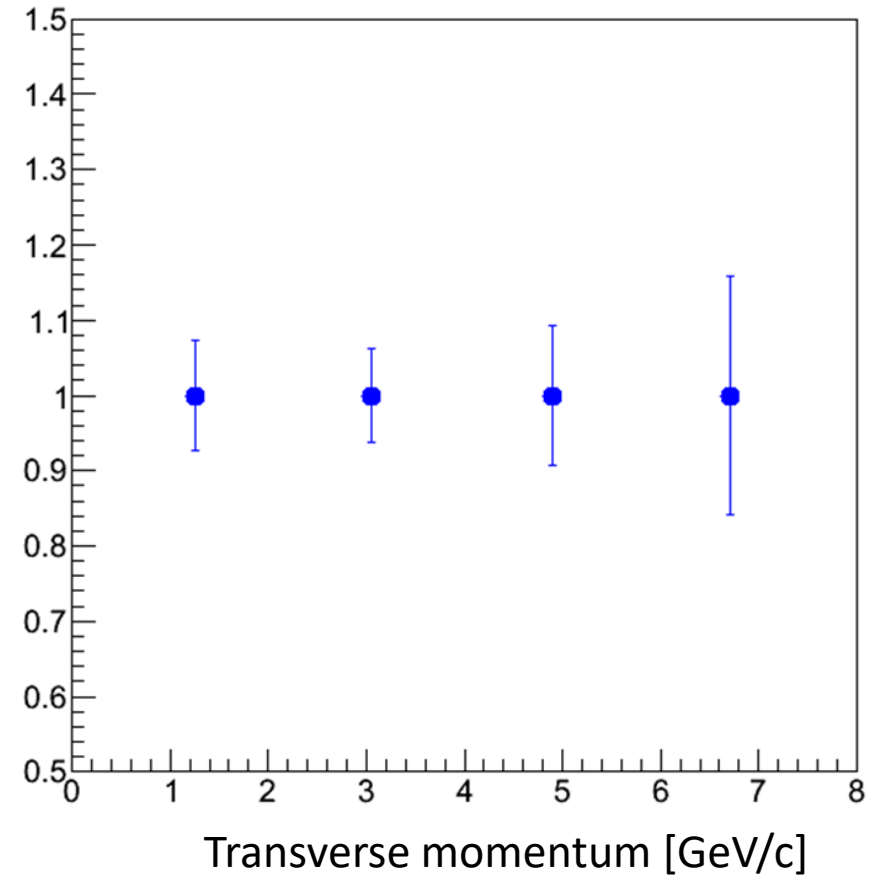
Sasha Lebedev (ISU)

The problem

Upsilon R_{AA} from sPHENIX proposal

Upsilon R_{AA} I've showed last week

How to deal with it?
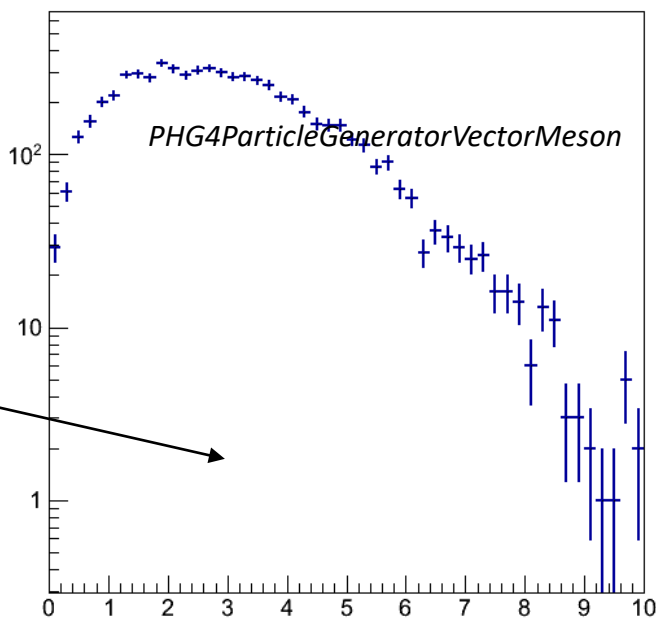
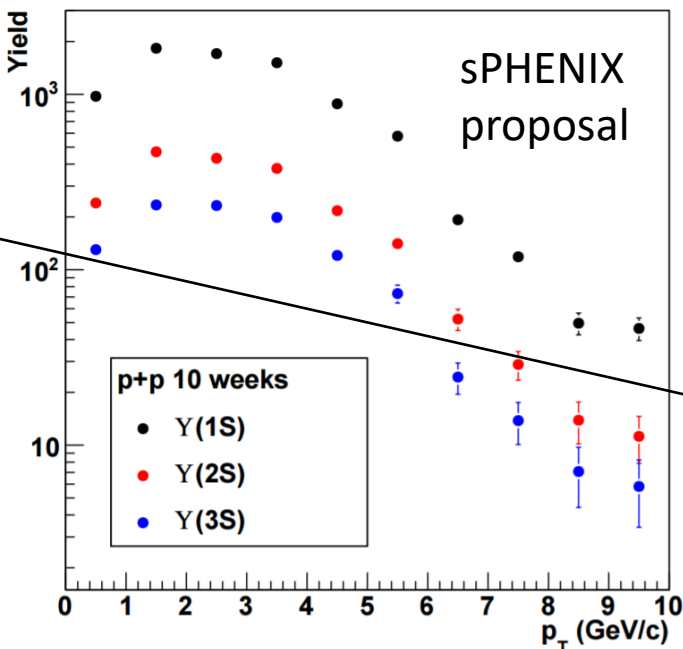Stat. uncertainty of R_{AA} has three components:
1) Stat. error of Y in Au+Au
2) Stat error of background in Au+Au
3) Stat error of Y in p+p

Take Y numbers from the proposal

Assume p_T distribution from *PHG4ParticleGeneratorVectorMeson*

Calculate stat. uncertainty coming from first and last items

Species	$\int$ L dt$(|Z| < 10cm)$	Events	$\langle N_{coll} \rangle$	eID eff.	Y(1S)	Y(2S)	Y(3S)
p+p	175 pb^{-1}	7350 B	1	0.9	8770	2205	1155
Au+Au (MB)		100 B	240.4	0.57	16240	4080	2140
Au+Au (0–10%)		10 B	962	0.49	5625	1415	740
p+Au (MB)	960 nb^{-1}	1680 B	4.3	0.84	6560	1650	860
p+Au (0–20%)		336 B	8.2	0.8	2360	592	311

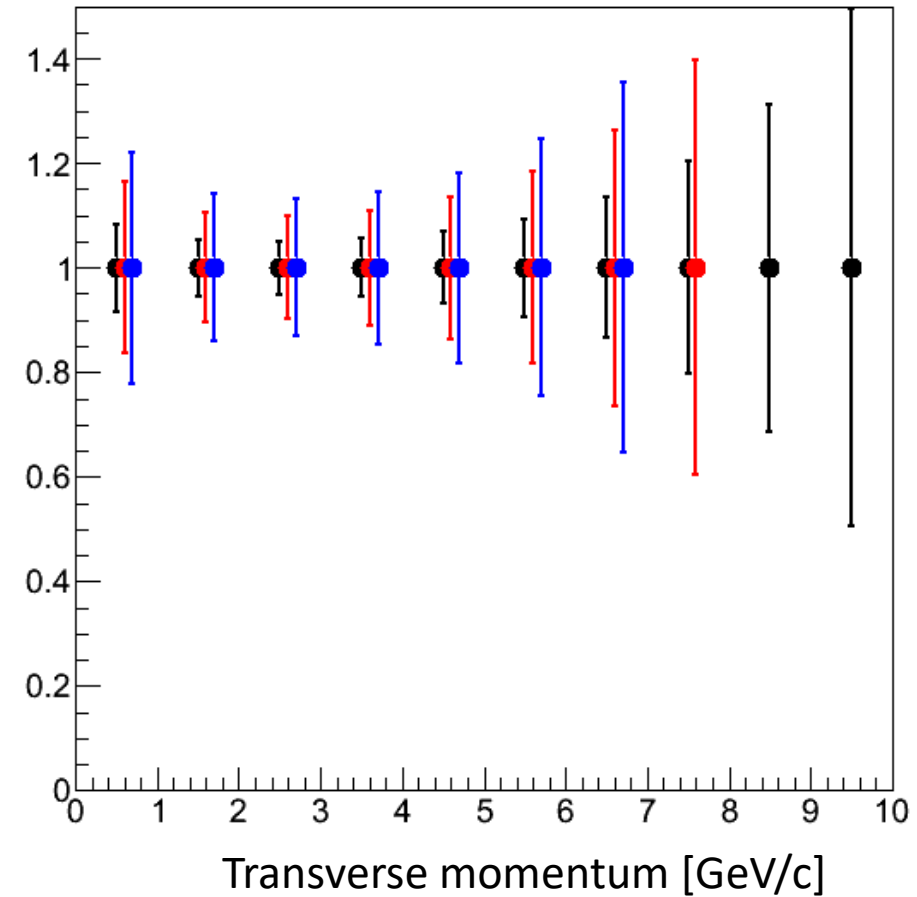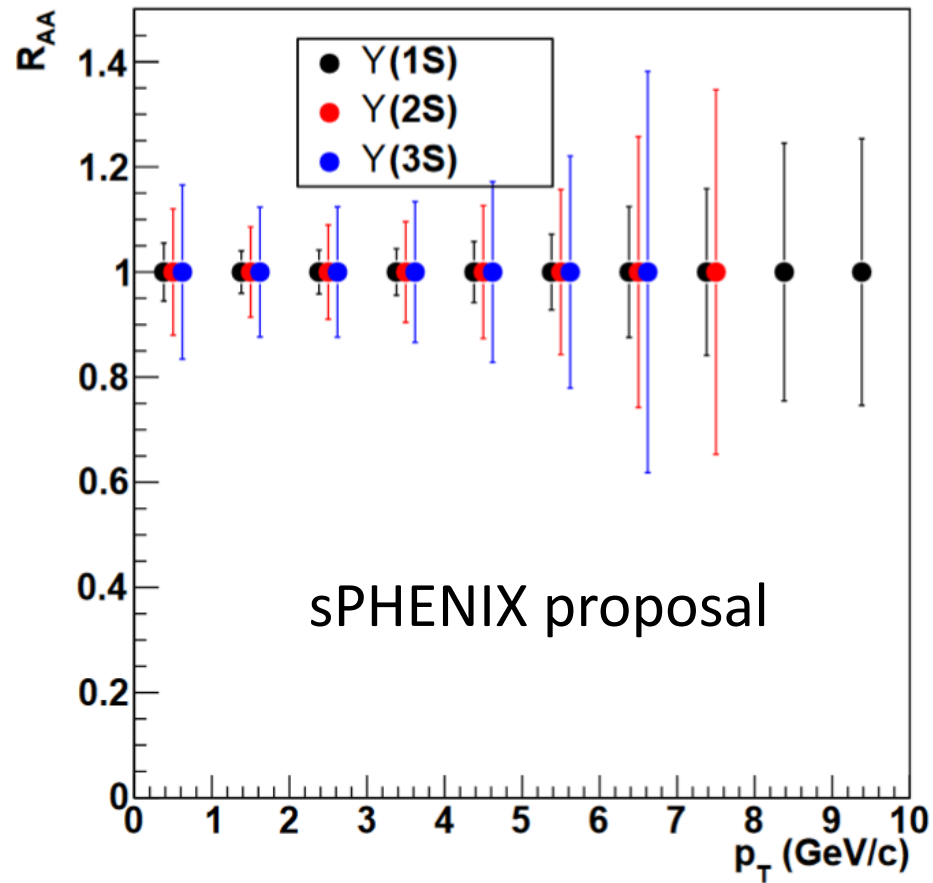# Compare to just $1/\sqrt{N_\Upsilon}$ in Au+Au (item 1)

sPHENIX proposal

relative error $=1/\sqrt{N_\Upsilon^{AuAu}}$
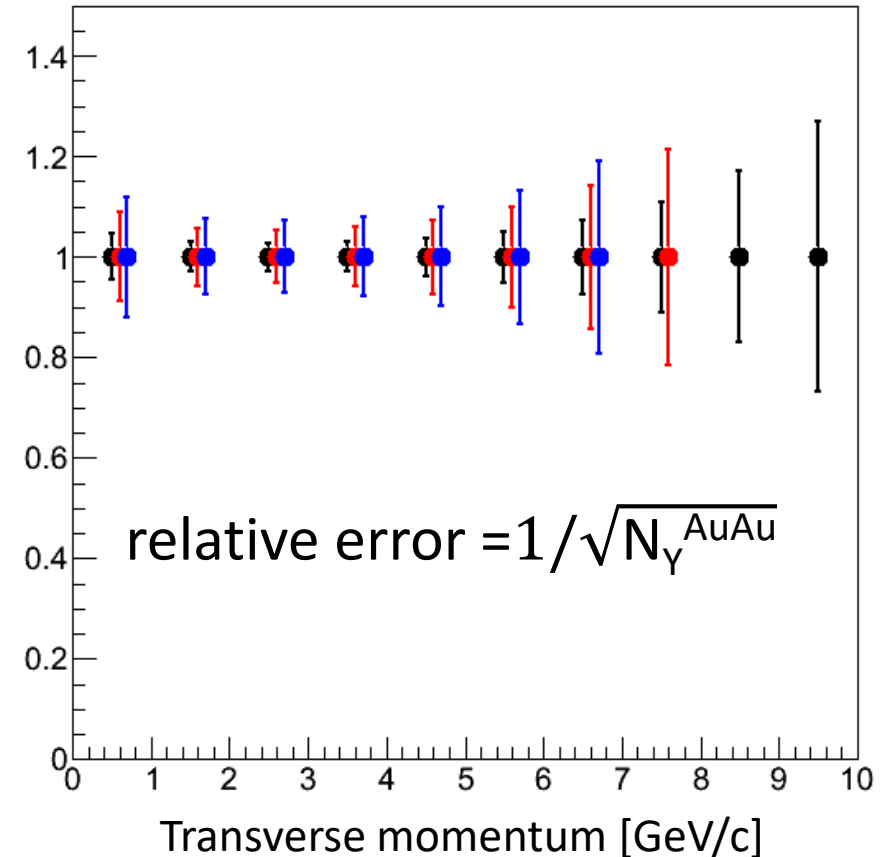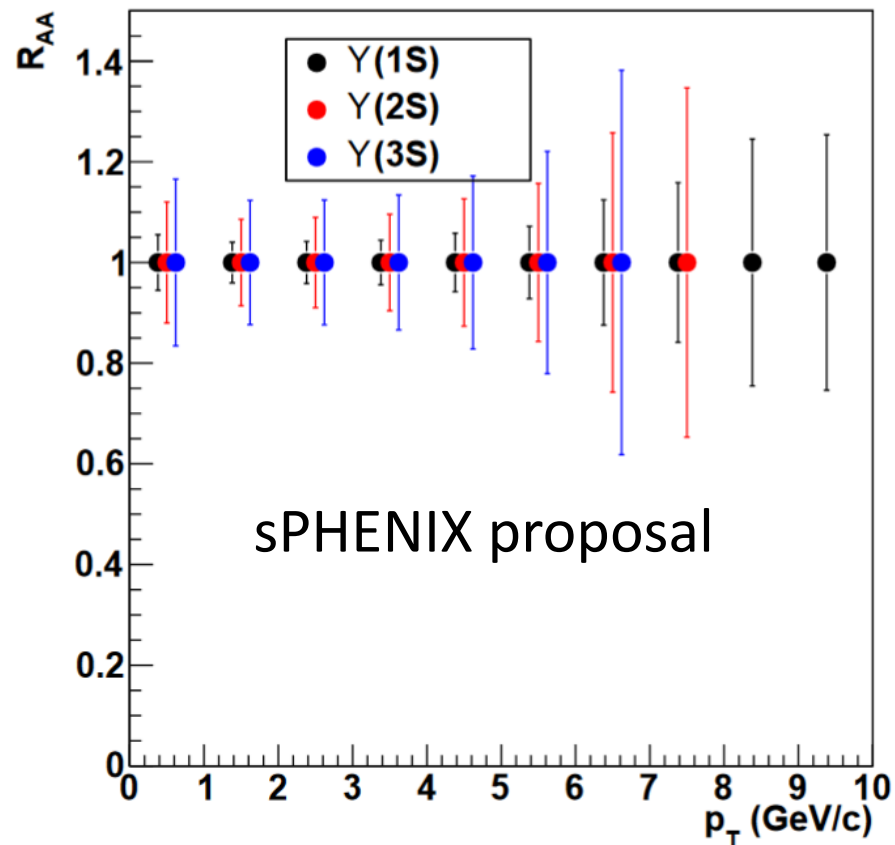
Left plot has comparable, but slightly better errors.
Tracking inefficiency? Limited mass range?

Compare to Au+Au and p+p error (items (1)+(3))

sPHENIX proposal

Stat. errors on left plot are clearly worse.

Conclusions

Most probably, the statistical uncertainty of R_{AA} in sPHENIX Proposal is just $1/\sqrt{N_Y}$ where N_Y is a number of Y in Au+Au in a certain invariant mass range (excluding low mass tail).
Background in Au+Au and uncertainty from p+p not included.